RHIC SPIN Flipper Commissioning*

M. Bai,W.W. MacKay, V. Ranjbar, T. Roser
BNL, Upton, NY 11973, USA

The RHIC spin physics experiments often requires different spin collision pattern during a store to reduce the systematic error. To achieve this, an ac dipole with horizontally oriented oscillating magnetic field (spin .ipper) was installed in RHIC to reverse the spin direction in the presence of two full Siberian snakes. With two full snakes, the spin depolarization resonances due to the machine imperfections and betatron oscillations are eliminated, and the spin vector completes one full precession around the vertical direction in two revolutions. Since the spin flipper provides an oscillating horizontal dipole field, an artificial "spin resonance" occurs if the spin flipper frequency is placed in the neighborhood of the spin precession frequency [1, 2, 3]. By slowly sweeping the spin flipper frequency across the spin precession frequency, a full spin flip can be achieved. This paper reports the results of the RHIC spin flipper commissioned during the RHIC 2002 polarized proton run. The effect of spin tune spread on spin flipping is also discussed in the paper. By running the spin flipper at a slightly different configuration, one can also measure the spin precession tune.

References

[1] D.D.Caussyn et al., 'Spin Flipping a Stored Polarized Proton Beam', Phys. Rev. Lett. 73, 2857 (1994).
[2] B.B.Blinov et al., 'Spin Flipping in the Presence of a Full Siberian Snake', Phy. Rev. Lett. 81, 2906 (1998).
[3] T. Roser, Handbook of Accelerator Physics and Engineering, P. 150, edited by A. Chao and M. Tigner.

Work performed under the auspices of the US Department of Energy.